



RadarRanger®:
Solutions for greater
installation safety,
efficiency, and system
availability.





Looking for innovative industry solutions made in Germany? You've come to just the right place! When hearing Titze, insiders spontaneously think of intelligent sensor solutions which guarantee a high degree of operational safety and system availability, even under tough conditions.

We are experts for special solutions which we create for all fields of the productive and processing industries. These are often the really tricky tasks, always under operating conditions, which already have proved to be »a too hard nut to crack« for others.

Hand-in-hand with our customers – we get things done together.



During the process, we've gathered a vast range of experience. When it comes to high-performance sensors and their peripheral equipment, we're hard to beat.

In the following pages, we focus on collision protection systems for container terminals. In fact, it's precisely there – in outdoor applications, in the harshest conditions and adhering to the highest safety standards – that sensor system solutions from Titze, which are configured to suit specific applications, fully reveal their advantages during operation. Advantages that, above all, are possible because of the enormous resistance to all outside influences and the ultimate results which offer clear benefits in safety and system availability.



The RadarRanger® series

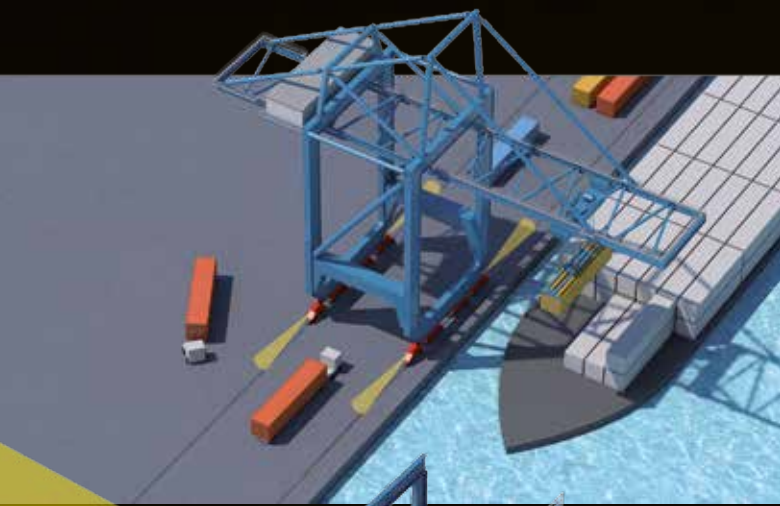
At the centre of our collision protection solutions for container terminals are sensors from the **RadarRanger®** series. These offer ideal performance features for use in this special area and their service life perfectly corresponds to the service life of the installations where they are deployed.

◀ *The portfolio: Consulting, production, sales & distribution, system integration, after-sales care*

Heavy duty and intelligence – that sound like fire and water. A pair of opposites which can nonetheless potentially create »fire-water« when combined.

This »recipe«, enriched with a high degree of technical competence, around 25 years of experience and inventiveness, purposefulness and creativity, discipline and enthusiasm, is emblematic of the powerful performance of Titze's sensor system ideas.

Welcome to the dialogue.



Example: Ship-to-shore crane, collision protection scenarios: Crane to crane and crane to obstacle

Required switching distance:

Up to 20 m (standard beam angle)



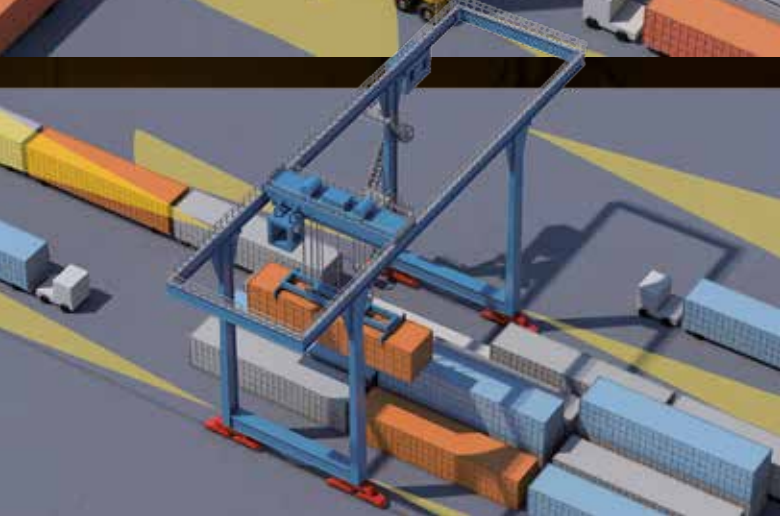
Example: RTG crane, collision protection scenarios: Crane to crane and crane to obstacle

Required switching distances:

Up to 40 metres (standard beam angle) for »crane to crane«

Up to 10 metres (standard beam angle) for »crane to obstacle«

Up to 10 metres (wide beam angle) in »cross travel«

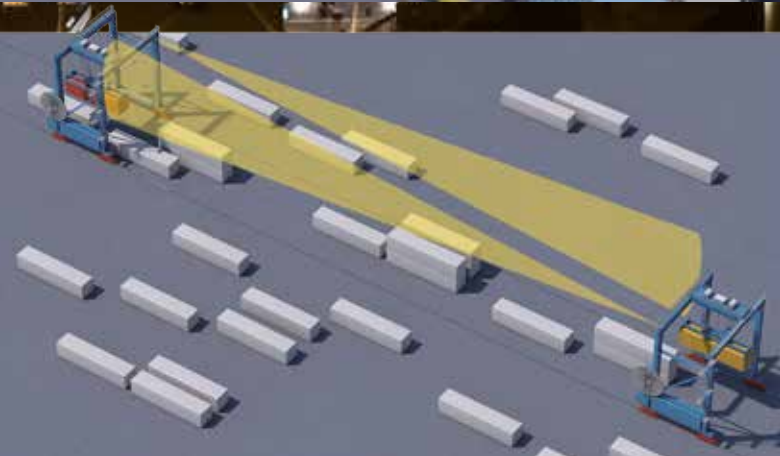


Example: RMG crane with high driving speeds, collision protection scenarios: Crane to crane and crane to obstacle

Required switching distances:

Up to 60 metres (standard beam angle) for »crane to crane«

Up to 20 metres (narrow beam angle) for »crane to obstacle«



Example: ARMG (automated RMG, with very high driving speeds of up to 300 m/min, braking distances of up to approx. 40 metres

Collision protection scenario: Crane to crane

Required switching distances:

Up to 100 m (narrow beam angle)



The task:

What is needed is a sensor solution which can safely detect objects that are on collision course and which allows for all collision scenarios, particularly for:

■ **Crane to crane:** Between container cranes and container bridges of all kinds

■ **Crane to obstacle:** Any collision between cranes and obstacles, such as trucks / trailers, order-picking vehicles or containers.

Next to offering the option of the task-specific adjustment of the sensing zones, these collision protection systems have to be **tough and resilient**.

Extreme weather and climatic conditions can sometimes prevail at outdoor installations such as container terminals. Sensor systems which don't perform adequately due to **solar radiation, wind, rain, snow, extreme temperatures, shocks, vibrations and other mechanical influences, as well as electromagnetic influences**, simply do not belong there.

The scenario:

There is always a latent risk of collision occurring between the different transport systems in container terminals despite clearly-marked lanes. Even though every crane may stick to its own movement profile, there is a wide variety of functions and sizes, trucks, trailers, order-picking vehicles and so on, so disruptions nevertheless arise time and time again by getting dangerously close to one another or by blocked lanes.

Due to the vast dimensions of crane installations, the drivers of cranes and container bridges, whether rail mounted gantry (RMG) or rubber-tired gantry (RTG) models, are hardly able to keep every angle of the operating area safely and permanently in view.

Due to their physical properties, sensors from the RadarRanger® series are not allowed to be used for tasks involving the protection of persons or for emergency stop functions.

RadarRanger®: The »eyes« of your crane are as good as your own – only, they can see everything at once..

The solution:

Sensors from the RadarRanger® series offer all the prerequisites for highly effective collision protection in container terminals: they have proved to be extremely tough and resilient at every level, and absolutely reliable and safe in detecting objects.

These FMCW radar systems work within a frequency range of 24,000 to 24,250 GHz. The detection zone of the systems i.e. range of the antennae, can be variably configured depending on use, task profile or sensor position. Suitable types of device are available for setting up different beam angles.

RadarRanger® was specially developed for setting up collision protection systems for fast-moving dockside cranes, such as the Straddle Carrier, RTGC, RMGC, STS and OHBC.

These systems from Titze have proved their worth in collision protection scenarios all over the globe – also in the most important ports of the world.

Welcome to greater safety in container terminals.

RadarRanger®: Sensors with specific construction designs and performance features are available for installing different beam angles and ranges.



Technical Data:

Common data of all sensor types

Material	Lower Housing Section: ALG, black anodized Housing Cover: POM-Plastic black colored
Protection Class	IP 67
Housing Dimensions (W x H x D)	100 x 100 x 42 mm / 190 x 100 x 42 mm / 400 x 100 x 42 mm
Supply Voltage	10 - 30 V DC
Current Consumption	typ. 135 mA, plus current for the Open-Collector-Outputs
Output	3 Open-Collector-Outputs with each 50 mA
Connection	5-pin Connector M12x1, RSF4 compatible
Sending Frequency	24.000 24.250 GHz
Transmitting Power	< 20dBm (EIRP) max.
Response Time	< 50 ms / < 70 ms (depending on specification)
Hold Time of the Outputs	ca. 0,1 1 sec depending on object dimensions
Readiness delay after power on	approx. 1 sec / approx. 2 sec (depending on specification)
Operating Temperature	-40 +85 °C

Beam angles / Antenna Characteristics

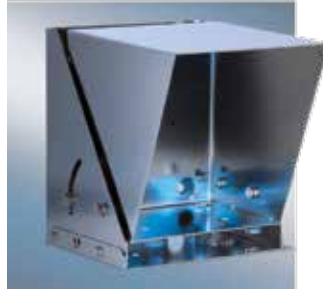
1.	11° (±5,5°) vertical und horizontal
2.	70° (±35°) horizontal and 11° (±5,5°) vertical
3. / 4.	11° (±5,5°) vertical und horizontal
5.	70° (±35°) horizontal and 11° (±5,5°) vertical
6. / 7. / 8.	5° (±2,5°) horizontal and 14° (±7°) vertical
9.	3,5° (±1,75°) horizontal and 15° (±7,5°) vertical
10. / 11.	11° (±5,5°) vertical und horizontal

Ranges

1.	0,2m Threshold (in 1m steps from 2 - 40 m adjustable)
2.	0,2m Threshold (in 1m steps from 2 - 25 m adjustable)
3.	up to 40 m (in 1 m steps from 4 - 40 m adjustable)
4.	up to 60 m (in 1 m steps from 6 - 60 m adjustable)
5.	up to 25 m (in 1 m steps from 4 - 25 m adjustable)
6.	up to 40 m (in 1 m steps from 4 - 40 m adjustable)
7.	up to 60 m (in 1 m steps from 6 - 60 m adjustable)
8.	up to 100 m (in 1 m steps from 10 - 100 m adjustable)
9.	up to 40 m (in 1 m steps from 4 - 40 m adjustable)
10.	up to 15 m
11.	up to 80 m

RadarRanger® collision protection sensors

- 1. Radar Scanner CRAT20-11/11**
Normal beam angle, wide range, mobile targets
- 2. Radar Scanner CRAT20-70/11**
Wide beam angle, short range, mobile targets
- 3. Radar Scanner CRAT20-11/11ST**
Normal beam angle, wide range, stationary and mobile targets
- 4. Radar Scanner CRAT20-11/11ST60m**
Normal beam angle, very wide range, stationary and mobile targets
- 5. Radar Scanner CRAT20-70/11ST**
Wide beam angle, short range, stationary and mobile targets
- 6. Radar Scanner CRAT20-5/14ST**
Narrow beam angle, wide range, stationary and mobile targets
- 7. Radar Scanner CRAT20-5/14ST60m**
Narrow beam angle, very wide range, stationary and mobile targets
- 8. Radar Scanner CRAT20-5/14ST100m**
Narrow beam angle, extremely wide range, stationary and mobile targets
- 9. Radar Scanner CRAT20-3,5/15ST**
Extremely narrow beam angle, wide range, stationary and mobile targets
- 10. Radar Scanner CRAT20-11/11ST-Master/Slave**
Field characteristics, stationary and mobile targets
- 11. Radar Barrier CRAS80-11/11**



Accessory programme:

Holders in different designs for sensors from the RadarRanger® series serve to facilitate comfortable installation and fine-tuned adjustment to the on-site situation.



Sensors from the RadarRanger® series detect objects at distances of up to 100 m.

The adjustment of the particular range needed is carried out in 1 metre steps. This value corresponds to the resolution of RadarRanger®. Depending on

the model, the sensors can detect either moving or stationary objects, or both.

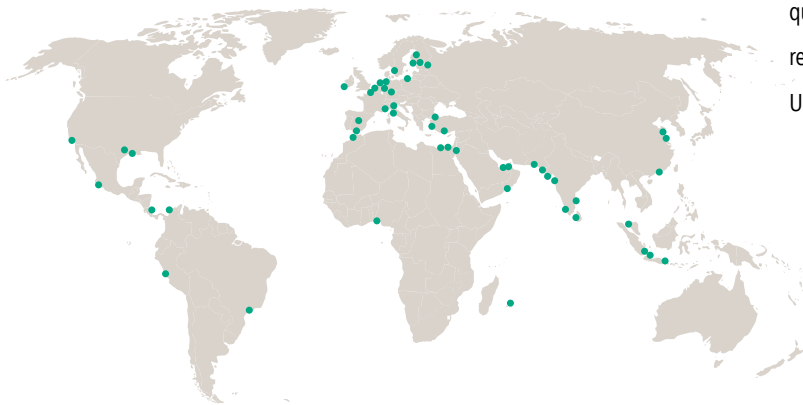
The systems report the detection of objects via open collector outlets, which are allocated to a 5-pole standard RSF4 connection. Each sensor has three

of these outlets. These transmit commands to stop and slow down, for example, and other commands for deceleration. In addition, the specific values needed are preprogrammed to suit the intended use.

Collision protection sensors from the RadarRanger® series are available with a wide variety of transmission frequencies, and take into account the different national and regional frequency ranges authorised for use throughout the world. They thereby fulfil not only the general international standard but also special requirements in the countries and regions of Great Britain, France, USA, and Canada.

Sensors from the RadarRanger® series: Data, facts, features for use

- Key features:**
- Wide ranges
 - Unsusceptible to environmental influences
 - Wide operating temperature range
 - High degree of protection
 - Heavy-duty casing



Greater versatility, greater safety, greater system availability: RadarRanger® collision protection systems are demonstrating their advantages for container terminals all round the globe – also in the most important ports of the world.



The programming unit for RadarRanger® enables users to adjust the range in accordance with the specific task.



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IDEEEN IN SENSORIK

The technical details and programme structure are subject to change.